

CLAIMS

1. A torque transmission apparatus comprising input and output coupling members arranged on a common axis of rotation, said coupling members being provided within a fluid housing and wherein each said coupling member is formed with a cylindrical portion that extends parallel to said axis of rotation, the inner surface of said cylindrical portion of a first of said coupling members being of a larger diameter than the outer surface of said cylindrical portion of the second of said coupling members, the cylindrical portion of said second coupling member being received within the cylindrical portion of said first coupling member so as to define a cylindrical gap therebetween, wherein an electrorheological fluid is provided in said fluid housing and filling the cylindrical gap between the coupling members, and means being provided for applying an electric field to said electrorheological fluid.
2. Apparatus as claimed in claim 1 wherein said fluid housing has a cylindrical inner surface that is slightly larger in diameter than the outer surface of the cylindrical portion of the first coupling member so as to define a further cylindrical gap which is also filled by the electrorheological fluid.
3. Apparatus as claimed in claim 1 wherein said first coupling member is formed with an axial shaft, said axial shaft having a diameter smaller than the diameter of the inner surface of the cylindrical portion of said second coupling

member so as to define a further cylindrical gap which is also filled by the electrorheological fluid.

4. Apparatus as claimed in claim 1 wherein said fluid housing is provided with a filling aperture for filling said fluid housing with electrorheological fluid.

5. Apparatus as claimed in claim 1 further comprising electromagnetic means for bringing a drive shaft into and out of engagement with said first coupling member.

6. Apparatus as claimed in claim 5 wherein said electromagnetic means comprises a coil arranged around said drive shaft, and said first coupling member is provided with a permanent magnet, whereby upon application of a current to said coil said drive shaft is moved into or out of magnetic engagement with said first coupling member.

7. Apparatus as claimed in claim 6 wherein a conductive plate is provided at the end of said drive shaft, and wherein a plate of magnetically permeable material is provided between said first coupling member and said drive shaft.

8. Apparatus as claimed in claim 5 wherein said first coupling member is provided with an axial shaft extending towards said drive shaft, and wherein a plate is provided around said shaft, said plate including said permanent

magnet means, and wherein a plate is provided at the end of said drive shaft, the plate at the end of the drive shaft and the plate surrounding the shaft extending from the first coupling member being provided with mechanical engagement means.

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9. Apparatus as claimed in claim 8 wherein said mechanical engagement means comprise slip lock pins formed on the plate provided at the end of said drive shaft and corresponding grooves formed in the plate provided surrounding the shaft extending from the first coupling member.

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10. Torque transmission apparatus comprising first and second coupling members, wherein said first and second coupling members are provided with respective cylindrical coupling surfaces is disposed around the transmission axis of the apparatus, wherein at least one cylindrical gap is defined by said cylindrical coupling surfaces and wherein an electrorheological fluid is provided in said at least one cylindrical gap and wherein means are provided for selectively applying an electrical potential to said coupling members.

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11. Torque transmission apparatus comprising first and second coupling members, an electrorheological fluid disposed between said first and second coupling members, means for selectively applying an electrical potential to said coupling members, and an input drive shaft for selectively engaging a first of said coupling members, wherein said first of said coupling members is

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provided with permanent magnet means, and wherein electromagnetic means are provided associated with said input drive shaft whereby said drive shaft may be selectively brought into engagement with or out of engagement from said first coupling member.

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12. Apparatus as claimed in claim 11 wherein said electromagnetic means comprises a coil disposed around said input drive shaft.

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13. Apparatus as claimed in claim 11 wherein a plate is provided at the end of said input drive shaft for engagement with said first coupling member.

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14. Apparatus as claimed in claim 13 wherein said input drive shaft and said first coupling member engage magnetically, wherein in engagement the plate provided at the end of said input drive shaft engages a securing plate provided between the input drive shaft and the first coupling member, said securing plate being of a magnetically permeable material and said permanent magnet means being located behind said securing plate.

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15. Apparatus as claimed in claim 13 wherein said first coupling member is provided with a shaft extending towards said input drive shaft, a plate being provided around said shaft and being provided with said permanent magnet means, and wherein the plate formed at the end of the input drive member and

the plate provided around said shaft are provided with mechanical engagement means.

16. Apparatus as claimed in claim 15 wherein the plate provided at the end of the input drive shaft is formed with lock pins, and wherein the plate formed around the shaft extending from the first coupling member is provided with corresponding grooves.